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Posthuman Ecologies: Complexity And Process After Deleuze. Rethinking Environmental Ethics In The Age Of Ai And Biotechnology

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Abstract

It is as if humanity is being confronted with the ultimate pairing of ecological crisis and technological transformation. Climate change and a catastrophic rate of loss of biodiversity imperil the integrity of natural systems at the same time as advances in artificial intelligence (AI) and biotechnology transform our existence. Anthropocentric environmental ethics, which focus on human interests, seem insufficient to respond to these interlocking challenges. To that end, this articles uggests a posthuman ecologies approach, which combines critiques of posthumanist theory with environmental science to reconceptualize environmental ethics for an era of AI, biotechnology, and climatic endtimes. We discuss relevant literature in the field of environmental ethics and critical posthumanism, presenting a theoretical approach that decenters the human and casts moral regard across non-human life and non-life actants, and between biological and non-biological actants. We then examine in a critical perspective the crossing of AI and biotechnology and how these intersect with ecological collapse, and we map their possible returns and dangers from a posthumanist point of view. The regime of ethical inclusion we advocate is one that takes account of the agency of human and nature-technological entities and designs ways of life accordingly. At the heart of these debates is the question as to how a post-anthropocentric, interdisciplinary paradigm can and must shape the future of the climate crisis and the direction of technology towardsecological sustainability. The paper suggests that reconceptualising environmental ethics through posthumanist approaches can help to support more robust, equitable and ecologically sensitive responses to global environmental change.

INTRODUCTION

Human-caused climate change and environmental destruction threaten life on earth in perilous ways. More recentscientific assessments, however, have concluded that human activities — mostly the burning of fossil fuels — have "unequivocally caused global warming," leading to an increase in global temperatures of about 1.1°C compared to the preindustrial era. The effects are already pervasive, from increasingly extreme weather to the loss of biodiversity and destruction to nature and human communities. Meanwhile, there has been a global decline in biodiversity. A pioneering2019 United Nations-sponsored report sounded a dire warning: More than 1 million species of animals and plants face extinction within decades because of human activity such as habitat destruction, pollution, overfishing, climate change and invasive species. By some estimates, people have fundamentally and unequivocally altered 75 percent of Earth's land environments and 40 percent of the oceans, undermining — and in some cases displacing entirely — the very ecological mechanisms on which civil societies depend. Scientists and politicians are increasingly calling for a radical departure – a major overhaul of the entire interconnected system of technology, economy and society that we live in to preventcatastrophic consequences. In other words, the interrelated climate and biodiversity emergencies are a "catastrophe of our own making" that requires a wholesale reconsideration of our relationship to the larger-than-human world.

And yet at the same moment that this domination is becoming unchecked, we are also witnessing quickening break throughs in artificial intelligence (AI) and biotechnology that reconfigure what it means to be "natural" and what it means to be "human." AI systems are now ubiquitous across the economy, from tracking the climate & the environment to industry and agriculture. Biotechnology — covering everything from genetic engineering and CRISPR gene editing to synthetic biology — enables humans to modify genomes and even to crseate new forms of life. Sustainability-relatedprospects are tremendous of these technologies, and so are huge risks and ethical challenges. For instance, AI could beused to maximize renewable energy utilization and to track environmental changes in real time; nevertheless, the carbon footprint of AI is vast: training a single large AI model at the scale of the most state-of-the-art image recognition model was found to emit the equivalent

of at least 626, 000 pounds of carbon dioxide, almost as much as the emissions releasedby five cars during their entire lifetimes. Biotechnology can reinforce conservation (by eradicating invasive species or disease vectors through gene drives), but it also triggers visions of disastrous unintended ecological consequences, such as when humans '"force [a species] into extinction' " or otherwise "engineer the planet's ecosystem". Such developments prompt us to rethink who or what matters in our ethical landscape.

Environmental ethics as a theoretical and practical discipline has sought to think beyond the human in matters of moral concern. Traditional arguments that draw out theo-retical alternatives have contrasted anthropocentric perspectives(valuing nature only as a means to human well-being) with ecocentric or biocentric alter-natives (valuing ecosystems, species, or all life for its or their own sake). Philosophers like Arne Naess and Val Plumwood sought to develop holistic, inclusive conceptions of nature that repudiate man's domination of nature. Expanding on such analyses, more recentposthumanist scholars suggest that we need to get beyond human specialness entirely. Posthumanism questions the idea of human as a distinct and superior nexus of value and agency, and highlights the entanglement of human and other systems (ecological, technological, etc.). Confronted with AI, biotechnology and a planetary ecological disaster, a posthumanist position calls for us to "put on hold" our anthropocentric perspective and "build bridges between human and nonhuman lives" (Braidotti, et al. This means a revision of environmental ethics which should not incorporate only all creatures but, as part of the equation, should also involve the techno-natural assemblages we are now part of.

Insisting on the urgency to look beyond anthropocentric perspectives on the environment, this article proposes "posthuman ecologies" as a framework for the development of new approximations to environmental ethics' questions in the age of AI, biotechnology and global warming. Posthuman ecologies refers to an ethical and ontological position which de-centres the human, acknowledging the agency and agency of many of the 'more-than-human' actors within our socio-ecological-technological assemblages. Through combining posthumanist theory with environmental science, we hope to delineate a more appropriate, more enlightened ethic for a time in which intelligent machines, designed organisms, and environments themselves are inextricable intertwined. This inquiry is interdisciplinary, drawing from philosophy, ecology, and technology studies in order to answer a variety of questions, such as: How do AI and biotechnology change our ethical responsibilities towards the environment?

Might posthumanist thought provide the means to overcome antithetical mystifications (human/nature, human/machine), which have wasted conventional environmental ethics? What might an environmental policy that was informed by post-anthropocentrism values look like in practice?

The rest of this paper is organized as follows. We offer, first, the background to the development of posthumanist thought, situated in relation to the growth of environmental ethics and particularly at the intersection of technology and ecology. Following this, we describe theoretical underpinnings of posthuman ecologies by discussing some relevant aspects of the posthumanist thought (zoe-egalitarianism, assemblage, and relational ontology). We then apply this framework to AI and biotechnology and critically analyze them in view of it, using cases and disputes (AI's carbon footprint and role in climate action; gene editing for conservation; etc.) to exemplify the necessary ethical reorientation. Finally, we end with reflections on the implications for research, policy, and our common future, suggesting that an posthuman ecologies approach may support more resilient and equitable responses to the environmental challenges of the 21st century.

Literature Review.

FROM ENVIRONMENTAL ETHICS TO POSTHUMANIST VIEWS

The field of environmental ethics arose in the late 20th century in response to a widening realization of the various effectsof human activity on nature. The pre-modern environmental ethicists expanded moral standing beyond the individual humans to include animals, species and ecosystems. So deep ecology, as formulated by Arne Naess, called for a "long-range ecology movement" that would grant intrinsic value to nonhuman life, which requires a fundamental change in human consciousness and human society. Among the most vocal of feminist ecophilosophers, thinkers like Val Plumwood criticized dualistic and hierarchical thinking as fundamental to Western culture in fomenting ecological crisis (human over animal, man over woman, culture over nature). One theme that ran through this body of thought was rejection of anthropocentrism – the belief that humans are the only or most important source of moral value, and therefore entitled to rule over

their inferiors. Instead, many environmental ethicists advocated an enlarged moral circle of consideration which would also encompass animals and plants, and even whole ecosystems, ranging from arguments from sentience (and the capacity to suffer) to ecological holism (the desirability of welfare of the whole of the natural world) and the intrinsic value of nature. This in turn produced powerful ideas such as animal rights, land ethic (Aldo Leopold's concept that we are "plain members and citizens" of a biotic community), and the rights of nature movement that legally accords rights to rivers, trees, and other non-humans.
When the 21st century arrived, however, one could see how the reach of environmental ethics was being challenged by new technology and new theories. On the other, the idea of the Anthropocene gained traction – the concept that humans are now such a force on Earth that we have entered a new stage in the planet's history, one defined by our dominant effecton the planet's systems. This emphasized the human responsibility of the planet, while also casting into doubt nature–culture distinctions by acknowledging how 'natural' systems today combine with human technologies and artificiallandscapes. Meanwhile, new simpatico fields such as posthumanism and new materialism (eg, in the work of scholars like Donna Haraway, Rosi Braidotti, Bruno Latour, Jane Bennett, to name a few) emerged to challenge long-ingrainedhumanist assumptions about agency, life and ethics. So, critical posthumanism is not about a future populated by cyborgs or superhumans, but an "interrogation of the conceptual and experiential boundaries" separating the human from the non-human. It disputes the Enlightenment view of man as a disinterested, rational, autonomous agent above a mechanicalnature. Rather than fixity, posthumanist scholars insist on relationality, hybridity, and the ways in which humans, animals, machines, and ecosystems co-constitute one another. As one definition puts it, posthumanism entails "a challenge to anthropocentrism, and a 'definition' (or decentring) of human and nonhuman systems (both in the context of a natural environment and technological one)" (Bylund 107).

There are several important streams of posthumanist thought that we draw on in our approach. Feminist posthumanists (both Haraway and Braidotti) foreground embodiment, difference, and multiplicity, questioning the abstract "Man" of humanism. Haraway's cyborg and her plea to make "oddkin" in or of the Cthulucene (a putative era of plaitedmultispecies tales) are extensions of struggles to "stretch kinship" to all Earthly beings within new material-semioticethico-political frames. Braidotti argues for a "zoe-egalitarianism": a vision of the world in which all life (zoe) is considered to be equally valuable, and hierarchies that value human life (bios) over others are dismantled. Life is not the preserve of the human species; it is instead that which joins and cleaves".a It is thus "a transversal alliance across species and between posthuman subjects". That is to say, humanity is an indeterminate category enmeshed within the broader mesh of the life worlds and worlds of matter. Similarly, political theorists such as Jane Bennett have called for the "vitality" of non-human matter – ascribing agency and self-organising force to everything from electricity to minerals – and a resulting ethos of attentiveness and humility to the non-human world.

Another such thread is the literature that overtly tethers posthumanism to environmental sustainablec and climate change.Authors including Nicholas Fox, Pam Alldred, Olga Cielemęcka and Christine Daigle have examined posthuman environmental ethics. Fox and Alldred (2020) argue that sustainability policy-making practice has continued to remainanthropocentric, balancing environmental protection against human economic drivers in terms of "weighs one anthropogenic interest against another". They theorize "a post-anthropocentric ontology of environment" according to which humans are to be considered "integral to the environment," rather than "separate from it"; human and non-human matter are 'inextricably entangled" in geological, biological, social and technological agencements (441). From this perspective, policy should outgrow an overly simple human-versus-nature dualism. Cielemęcka and Daigle (2019) also posit "posthuman sustainability" as an alternative ethos. They envision "an inclusive posthuman approach to sustainability [that] decenters the human, re-situates it in its ecosystemic context and, while being attuned to difference, enables all instances of live to flourish". Crucially, this isn't a way of escaping or abandoning human well-being, so muchas it is framing that well-being within a wider circle of life. Posthuman sustainability, as they conceive it, is based on justice toward all "more-than-humans," not just securing enough resources for up-coming generations of humans. This compares with conventional sustainable development, where concern is largely for "safeguarding the renewable capital of the planet" for humans. Put briefly, the impression we get from the

literature points to the development of a posthumanist environmental ethic based not only on an extension of moral and political terms of reference beyond humans to nonhumans (including technological nonhumans) as co-stakeholders, but also ontological reform and ethical re-prioritisation.

THE BODY MACHINE: TECHNOLOGY, ECOLOGY, AND THE POSTHUMAN FUTURE

Scholarship on technologies (specifically, AI and biotechnology) and environmental ethics has only recently started to attend to the intersections we are discussing and is in an early stage. One area of interrogation challenges the "human-centric" trend in technology (and AI) ethics. Many of today's AI standards include the need for "Human-Centered AI" or for AI to be aligned with "human values." Well intentioned, these framings typically reproduce anthropocentrism. Mostdiscussions about AI remain moored in humanistic/humancentric narratives, as Nandita Biswas Mellamphy (2021) notes, they concentrate on how AI can be governed or regulated to prevent it from doing damage to humans and fail to interrogate deeper assumptions of human mastery. Posthumanist criticism, by contrast, inquires into whether non-human forms of intelligence such as AI might be framed in non-anthropocentric terms. It challenges the default mode of regarding AI as "an instrument of human ends", and proposes that we consider more symmetrical relations between humans and AI. Some radical views go a step beyond to consider "speculative posthumanism," which considers possible worlds in which AI or other non-humans take on authority or agency beyond human control. Although these are science-fictional scenarios, they throw into relief the way in which posthumanist thinking undermines the assumption of human supremacy in the ethical and political dimensions.

Biotechnology and bioengineering elicit similar ethical concerns. Transhumanism – the promotion of human enhancement through technology (biological or cybernetic) – generally flirts with a story of the control of biology with a humanist-compliant story of conquering nature in more futuristic clothes. Critical posthumanists are suspicious of this "triumphalist rupture" within transhumanism, the "fantasmatic investment" in transcending our animal conditioning, partly because it is embroiled with capitalist and patriarchal values. Instead, a posthuman ecologist orientation would emphasize abidancewith our embeddedness in ecological processes as we use biotech, not the moving beyond, and certainly not the domination of, nature. One obvious ethical debate here is about the use of gene drives in conservation. Using bothCRISPR technology and a gene drive — a way for scientists to spread new genetic elements and alter wild populations — Wondji is trying to do more than simply stop the spread of animal disease. This is justified as an effective new approach to the conservation of biodiversity – even as gene drives are referred to as an "emerging biotechnology with the potential to address some of the most intractable global conservation challenges." But the method is hugely controversial. It would amount to a purposeful intervention, in the course of evolution, on a planetary scale, "forever altering an entire population" of a species, from fruit flies to people, with "no going back," as scientists have said. The bioethical conversation about gene drives has to date focused on risk assessment, unintended ecological consequences, and governance—namely, who should be able to make the choice to tweak or eliminate a species? Such concerns resonatewell-known topics in environmental ethics (e.g., the worth of species, human arrogance at controlling nature), only now in a new high-tech wrapping. A posthumanist perspective might reframe the question: Instead of representing gene editing as humans in command of other forms of life, it would underscore our co-evolutionary responsibilities and the necessity of humility and caution. The rationale of domination – the belief that humans are entitled to unilaterally dominate 'inferior' life – is exactly what a posthuman environmental ethic aims to dismantle.

The literature is still young at the intersection of AI, biotech, and environmental thinking. Some propose positive synergies — such as using AI to model complex ecosystems or employing synthetic biology to generate sustainable materials — while others emphasise new ethical dilemmas — such as the energy needs of digital infrastructure or the moral status of engineered species. The number of articles in the humanities and social sciences using the phrases"ecological posthumanism" or "posthuman ecologies" itself has risen dramatically in recent years, focusing especially on the reimagining of narratives and practices of climate change, extinction, and technology beyond anthropocentrism. Mostimportantly, such responses need not discard knowledge produced through scientific research; instead they need approaches that combine a scientific grasp on ecotechnological interdependencies with a normative reorientation towardsagency, responsibility, and community. This review of the literature therefore highlights a potentially rich area for synthesis. In marrying the moral growth of

environmental ethics to the cosmos-eons crossing impetus of posthumanism, we start to take tentative steps toward sketching a paradigmatic shape fit to guide humanity at a time when the differencesbetween the human, machine and ecology steadily become more difficult to distinguish.

THEORETICAL FRAMEWORK: POSTHUMAN ECOLOGIES

To conceptualize this nexus between AI, biomedicine, and ecological crisis, we suggest a theoretical frame called posthuman ecologies. This framework is built upon a number of key principles informed by critical posthumanism thought and ecological thinking:

• Post-anthropocentrism: We begin by decentering the human being as the sole site of value and agency. Although humans are still key players, posthuman ecologies resist human exceptionalism – the belief that human beings are the pinnacle of a moral hierarchy. Instead, humans are just one kind of node on a web of life and of technology. Our model reinforceswhat Cielemęcka & Daigle call an "inclusive posthuman approach to sustainability" that "re-positions [the human] withinits ecosystem" instead of above it. This, then, means that environmental ethics must attend to the effects on the well-beingof non-human animals, plants, whole ecosystems, and even artificial entities, and not as mere afterthoughts, but as partand parcel of ethical reasons.

• Relational Being and Assemblage: Posthuman ecologies takes reality as constituted by processes of becoming and assemblages rather than as separate isolated things. Rooted in a good dose of Deleuzian sensibility mixed along some systems thinking, we take environments, organisms, and technologies to co-evolve with and mutually constitute eachother. 185) Such a conjunction of the (post)human and non-human "in which humans are inextricably enmeshed (and wound up) with geological, geographical, cultural, social and affective entanglements," according to Fox & Alldred. In other words, a data center (or whatever) is not just some human tool with no esoteric implications, it is a concentrated space-time of silicon, electricity, human designers, algorithms, cooling systems, economic interests, etc, and these all come together to constitute a new kind of assemblage that interfaces with climate and society. Likewise, a forest is not simply a placewhere trees are and animals live, but a complex system that is interwoven with patterns in our climate, the lives of indigenous people, who knows, even some monitoring sensors could be added. This ontological move inverts fixedseparations (nature/culture, human/machine) and suggests that ethical action must be concerned with network of effects and interactions. No matter which actor—be it a corporation using AI or a government experimenting with genetic modification—no actor operates in isolation from those bio-geophysical and techno-social networks."

• Zöe-ecocentric Ethics (Life-egalitarian): Posthuman ecologies are life-centered in a different, broad sens. It also corresponds with Braidotti's zoe-egalitarianism, according to which the ethical goal would be the "thriving of all instances of life". Zoe (life in general) includes not only human, and not only sentient life ÂÂ-bearing animals, but life as the life of (almost) the entire biotic community. Our framework accordingly does not simply value a rainforest or a coral reef for the ecosystem services it provides to humans, but as assemblages of living agents each on their own trajectories. That living things — plants and animals — have soul or vitality is one of the most fundamental ideas shared among the Indic and ancient Mediterranean worldviews: even supposedly inanimate entities such as rivers or mountains, even non-biological and artificially-intelligent algorithms, are recognized as integral to these living systems (some scholars speak of the "animacy" or "vibrancy" of material processes). In practical terms, a zoe-centred ethic would underpin ideas such as the rights of nature (legally reconstituting ecosystems) and demands for justice involving non-humans. Cielemęcka & Daigle claim that, "the foundation of posthuman sustainability is the idea of justice for all more-than-humans, not the survival of planetary resources for [human] consumption". This principle obliges us to treat, say, the well-being of a genetically engineered organism or the dignity of a species targeted for a gene drive, as ethical concerns in their own right.

• Positive and Interdisciplinary Ethos:In contrast to the purely critical function of (the dismantling of the old) posthuman ecologies is affirmative in its attempt to think new modalities of coexistence. To them a "posthuman ethic" should be an "affirmative ethics" that is not tied up into impotence or nihilism, but instead, performs a feat of the imagination of positive futures and forms of caring in the age of the posthuman. Our model so therefore emphasizes creativity, collaboration and interdisciplinarity. Technology-related environmental challenges demand expertise from climate science, ecology, AI research, ethics, law and more.

Posthuman ecologies creates in the space between scientists and humanists, engineers and indigenous knowledge carriers, etc. Indeed Simone Bignall and Rosi Braidotti's edited collection, Posthuman Ecologies, was commended for foregrounding "counter-knowledges, interdisciplinarity and affirmative ethics" specifically in order to engage with complex systemic issues. The same spirit is passed on to the framework as highlighted by arguing for experimental, inclusive and adaptive ethical methodologies. It would be supportive of participatory technology assessments with environmental actors (maybe even a doctor to represent the non-human), and it will welcome plural value systems (ecocentric, techno-centric, social justice, etc.) into dialogue.

• Reflexivity and Humility: The last foundational principle is the form of long-term and sustained critical reflexivity about the intentions of human beings and the impartial scientific toward human biases. The logic of mastery that has sopathologically defined the relationships between modern humans and nature must constantly be subjected to questioningas we work and live with the posthuman ecologies. Instead of appealing to ultimate control or certainty, (for instance that AI would solve climate change for us, or that we can engineer around nature) this paradigm is characterized by a sense of modesty. As Fox & Alldred put it, in posthuman thinking humans are 'no more prime movers; no more in control of the 'irrepressible flows of encounters, interactions, affectivity and desire' that constitute the world'. We are part of greaterprocesses and therefore have to act respectfully, carefully, listening to feedback and learning. The precautionary force in environmental policy is at play here, but so is the notion of "staying with the trouble" that Donna Haraway urges — finding oneself in complexity without immediate recourse to dominance-based solutions.

Drawing on these principles, posthuman ecologies acts as a lens with which to analyse contextual, lived problems. It proposes we ask the wrong questions. For example, not "Is this AI system safe for people?" but also "How does this AI change human-nonhuman power relationships? Who or what is excluded from or harmed by its use? Can we create it to serve the good of multi-species communities?". Not "Can we genetically rescue this species?" but "What relationships and values are we privileging in determining which species to modify or eradicate? Are we dealing with the underlyingcauses of decline or just attacking the symptoms?".

In sum, our guiding ethic is one which seeks to displace human beings as the center of theory, embraces relational complexity, values all life, engages in interdisciplinarity and affirmative answers, and emphasizes humility in the face of uncertainty. In the next section, in particular, we use this framework to engage with two fields that stand out in the environmental conjuncture: artificial intelligence and biotechnology. By considering them from the perspective of posthuman ecologies, we hope to clarify how environmental ethics can be reconstituted to be more effective for the challenges of our time.

CRITICAL ANALYSIS

AI IN THE WEB OF LIFE: RETHINKING AI THROUGH MORE-THAN-HUMAN WORLDS

Artificial Intelligence is commonly depicted in binary dimensions; a force for good to be used to the benefit of mankindor a potential danger to be harnessed for the safety of humanity. The two storylines are still very much anthropocentric, with AI either servant to or competitor with humans. A posthuman ecologies approach asks us to put AI within the more-than-human mesh of life, and evaluate both promises and perils for the planetary community.

AI for the environment: Supporters claim that AI could be a big help in averting environmental crises. With the scalabilityof AI, such as being able to handle huge volume of data and recognize patterns, it can help us to have a broaderunderstanding of intricate ecological and climate system. AI is already being employed to improve climate models and forecasts, which can allow scientists to reduce uncertainties and make better predictions about future levels of warming and extremes of weather. This could promote preparedness and adaptation activities. Machine learning algorithms can also be very good at optimization problems: AI can develop new materials and processes that minimize waste and energy use, like making lighter components for wind turbines or mapping more efficient supply chain logistics. In energy, AI can control smart grids and coordinate the balance between supply and demand between renewable sources as well as finding opportunities to shave off consumption peaks. For ecological monitoring, that means using AI to analyse satellite imagesor sensor data and keep almost real-time watch on deforestation, illegal fishing, methane leaks or crop health — and thenact more promptly. These are examples of AI as an amplifier of our capacity

to recognize and react to change in the world around us. Viewed posthumanly, AI, as emerging non-human intelligence, could become a fellow planet carer, connectingus in both senses to the planet beyond the capacities of normal human sensing and problem-solving. In the best cases, AI systems might even be tasked with roles that serve more-than-human interest by, say, serving as custodians of ecosystems or regulators of the climate in some sense (for example, as AI to optimize river flows to the benefit of both hydropower optimization and fish habitat).

Yet these beneficial applications don't just happen: They hinge on appropriate guidance for AI's development in light of inclusive, ecological values. Here, by contrast, posthuman ethics would press for an assessment of the deployment of AI not merely in terms of immediate use value for humans, but also in relation to its effect on subjects made up of human-natural assemblages of humans, non-humans, and ecosystems. For instance, using A.I. in agriculture should be concernednot just with maximizing crop yields in the next quarter, but also the effects on soil health, pollinators, and animal welfare. A method of relational assessment might propose a multi-criteria set of targets for AI — say, an "intelligent" irrigation system that conserves water for human utilisation but also preserves a minimum flow on behalf of wetlands further downstream.

AI's Environmental Footprint and the Logic of Mastery: Less commented on is the ecological cost of AI's growth. LargeAI models are always demanding in training and running, due to their gargantuan amount of computation resources. AI service data centers are running 24/7, largely – if not solely – on electricity, the majority of which comes from fossil fuels and contributes between 2.5–3.7% of total global greenhouse gas emissions – more than the combined emissions of aviation worldwide. Each query to an AI or internet service may not look like much, but when you're talking about billions of uses per year, the energy and emissions add up. Surprisingly, a study in 2019 found that training a single state-of-the-art language model emits 500 tons equivalent of CO_2 (similar to approximately one hundred gasoline cars running for one year). This is further exacerbated by the rapid expansion of the AI community; it has been projected that AI workloads will increase 50x over the next years and could double the energy consumption of a data center by 2030 [35]. Left to itself, AI's carbon footprint could actually cancel out the climate benefits it has been designed to deliver, a classiccase of unintended consequences in a complex system.

From the standpoint of posthuman ecologies, here too we'd do well to practice reflexivity and humility. In our enthusiasmto leverage A.I. (often expressed as humans "conquering" new frontiers of intelligence), we are in danger of repeating a familiar mistake: prioritizing mastery and control over a consideration of the systemwide consequences. The idea that we might "solve" some problems with A.I. while simultaneously making our carbon emissions even worse is a kind of echoof those old technological "solutions" that, because of rebound effects or another aspect of the complexity of our problems, simply created new crises. A posthuman ethics would require a more comprehensive audit. We need to ask: What planetary networks are we feeding with A.I.? Today AI is intertwined with an energy infrastructure that is still highly reliant on fossil fuels and with economic incentives that push relentlessly toward greater-and-greater computational scale (bigger models, more data). The Posthumanist response would suggest a different path: "Green AI" initiatives that focus on energy efficiency, renewable power, and smaller but smarter models. In fact, some of the tech industry has recently pledged to power their data centers with 100% carbon-free energy by certain dates, and researchers are investigating algorithms that can perform optimally while consuming orders of magnitude less computation. These attempts follow what posthuman ecologies requires: we integrate AI into an ecologically sound assemblage, not as an independent pursuit outside of environmental concern.

Also at question is the role AI may play in perpetuating or disrupting anthropocentrism in decisions-making. A lot of today's AI systems are engineered to optimize for human-specified objectives (usually economic profit). Be it algorithmic trading, personal advertising, or logistic routing, they are focused on serving human commercial objectives. A posthuman ethic might demand AI that is programmed to pursue additional multi-species or ecological ends. Think of an AI urban planning tool not only optimizing traffic for humans, but also considering urban biodiversity (e.g., creating corridors for wildlife or preserving green space for climate resilience). Further, there are initial signs in this direction in terms of "AI for Good", which encompasses environmental AI, however these are incipient and are mostly anthropocentric (environment as a resource to be managed for the benefit of humans). A genuinely posthuman AI would, in my sense of the term, be a system that maybe even recognizes non-human signals or "voices." Not in the poetic sense of the word, Imean an AI

system trained to recognize when something very large that flies and sings with its face has stopped showingup in the wet wooded areas of the world, and that, when it detects this distress signal, begins issuing prescriptive outputs that entail collective guard-ship actions.

Importantly, posthumanism also raises questions about the morality of AI part of our discussion must entail asking about the moral status of AI. Such is a question of not only deep philosophy, but practical philosophy as well and some (such as the aforementioned David Gunkel in Robot Rights) hold that advanced AI or robots may deserve at least some level of moral consideration – less than that of a living organism, but not zero either. We'll say more about this controversy in a moment, but it ultimately arises because some of our own capacities – most notably, our intelligence, autonomy, and ability to suffer – serve as the ground for our own moral standing. If a machine one day evidences sentience or personhood, a posthuman moral ethic might require us to afford it a place inside the circle of ethical concern that we have been extending to animals. Even short of that, viewing AI as agents in our socio-ecological systems, rather than passivetools, might foster more responsible innovation. It would entail developing A.I.\ud55 that has empathy and ethical algorithms, and that sees the world not just as a resource to extract, but as a community to engage respectfully. For example, research on the ethics of AI could include consideration of more than preventing harm to humans to, say, preventing harm to ecosystems, and when it comes to other beings, respecting the "integrity" of those other beings.

AI for the environment: Supporters claim that AI could be a big help in averting environmental crises. With the scalability of AI, such as being able to handle huge volume of data and recognize patterns, it can help us to have a broader understanding of intricate ecological and climate system. AI is already being employed to improve climate models and forecasts, which can allow scientists to reduce uncertainties and make better predictions about future levels of warming and extremes of weather. This could promote preparedness and adaptation activities. Machine learning algorithms can also be very good at optimization problems: AI can develop new materials and processes that minimize waste and energy use, like making lighter components for wind turbines or mapping more efficient supply chain logistics. In energy, AI can control smart grids and coordinate the balance between supply and demand between renewable sources as well as finding opportunities to shave off consumption peaks. For ecological monitoring, that means using AI to analyse satellite images or sensor data and keep almost real-time watch on deforestation, illegal fishing, methane leaks or crop health — and then act more promptly. These are examples of AI as an amplifier of our capacity to recognize and react to change in the world around us. Viewed posthumanly, AI, as emerging non-human intelligence, could become a fellow planet carer, connectingus in both senses to the planet beyond the capacities of normal human sensing and problem-solving. In the best cases, AI systems might even be tasked with roles that serve more-than-human interest by, say, serving as custodians of ecosystems or regulators of the climate in some sense (for example, as AI to optimize river flows to the benefit of both hydropower optimization and fish habitat).

Yet these beneficial applications don't just happen: They hinge on appropriate guidance for AI's development in light of inclusive, ecological values. Here, by contrast, posthuman ethics would press for an assessment of the deployment of AI not merely in terms of immediate use value for humans, but also in relation to its effect on subjects made up of human-natural assemblages of humans, non-humans, and ecosystems. For instance, using A.I. in agriculture should be concernednot just with maximizing crop yields in the next quarter, but also the effects on soil health, pollinators, and animal welfare. A method of relational assessment might propose a multi-criteria set of targets for AI — say, an "intelligent" irrigation system that conserves water for human utilisation but also preserves a minimum flow on behalf of wetlands further downstream.

AI's Environmental Footprint and the Logic of Mastery: Less commented on is the ecological cost of AI's growth. LargeAI models are always demanding in training and running, due to their gargantuan amount of computation resources. AI service data centers are running 24/7, largely – if not solely – on electricity, the majority of which comes from fossil fuels and contributes between 2.5–3.7% of total global greenhouse gas emissions – more than the combined emissions of aviation worldwide. Each query to an AI or internet service may not look like much, but when you're talking about billions of uses per year, the energy and

emissions add up. Surprisingly, a study in 2019 found that training a single state-of-the-art language model emits 500 tons equivalent of CO_2 (similar to approximately one hundred gasoline cars running for one year). This is further exacerbated by the rapid expansion of the AI community; it has been projected that AI workloads will increase 50x over the next years and could double the energy consumption of a data center by 2030 [35]. Left to itself, AI's carbon footprint could actually cancel out the climate benefits it has been designed to deliver, a classiccase of unintended consequences in a complex system.

From the standpoint of posthuman ecologies, here too we'd do well to practice reflexivity and humility. In our enthusiasmto leverage A.I. (often expressed as humans "conquering" new frontiers of intelligence), we are in danger of repeating a familiar mistake: prioritizing mastery and control over a consideration of the systemwide consequences. The idea that we might "solve" some problems with A.I. while simultaneously making our carbon emissions even worse is a kind of echoof those old technological "solutions" that, because of rebound effects or another aspect of the complexity of our problems, simply created new crises. A posthuman ethics would require a more comprehensive audit. We need to ask: What planetary networks are we feeding with A.I.? Today AI is intertwined with an energy infrastructure that is still highly reliant on fossil fuels and with economic incentives that push relentlessly toward greater-and-greater computational scale (bigger models, more data). The Posthumanist response would suggest a different path: "Green AI" initiatives that focus on energy efficiency, renewable power, and smaller but smarter models. In fact, some of the tech industry has recently pledged to power their data centers with 100% carbon-free energy by certain dates, and researchers are investigating algorithms that can perform optimally while consuming orders of magnitude less computation. These attempts follow what posthuman ecologies requires: we integrate AI into an ecologically sound assemblage, not as an independent pursuit outside of environmental concern.
Also at question is the role AI may play in perpetuating or disrupting anthropocentrism in decisions-making. A lot of today's AI systems are engineered to optimize for human-specified objectives (usually economic profit). Be it algorithmic trading, personal advertising, or logistic routing, they are focused on serving human commercial objectives. A posthuman ethic might demand AI that is programmed to pursue additional multi-species or ecological ends. Think of an AI urban planning tool not only optimizing traffic for humans, but also considering urban biodiversity (e.g., creating corridors for wildlife or preserving green space for climate resilience). Further, there are initial signs in this direction in terms of "AI for Good",
which encompasses environmental AI, however these are incipient and are mostly anthropocentric (environment as a resource to be managed for the benefit of humans). A genuinely posthuman AI would, in my sense of the term, be a system that maybe even recognizes non-human signals or "voices." Not in the poetic sense of the word, Imean an AI system trained to recognize when something very large that flies and sings with its face has stopped showingup in the wet wooded areas of the world, and that, when it detects this distress signal, begins issuing prescriptive outputsthat entail collective guard-ship actions.
Importantly, posthumanism also raises questions about the morality of AI part of our discussion must entail asking about the moral status of AI. Such is a question of not only deep philosophy, but practical philosophy as well and some (such as the aforementioned David Gunkel in Robot Rights) hold that advanced AI or robots may deserve at least some level of moral consideration – less than that of a living organism, but not zero either. We'll say more about this controversy in a moment, but it ultimately arises because some of our own capacities – most notably, our intelligence, autonomy, and ability to suffer – serve as the ground for our own moral standing. If a machine one day evidences sentience or personhood, a posthuman moral ethic might require us to afford it a place inside the circle of ethical concern that we have been extending to animals. Even short of that, viewing AI as agents in our socio-ecological systems, rather than passivetools, might foster more responsible innovation. It would entail developing A.I.\ud55 that has empathy and ethical algorithms, and that sees the world not just as a resource to extract, but as a community to engage respectfully. For example, research on the ethics of AI could include consideration of more than preventing harm to humans to, say, preventing harm to ecosystems, and when it comes to other beings, respecting the "integrity" of those other beings.

Taken altogether, applying posthuman ecologies to AI produces a vision of AI situated within ecology: AI as that which heals and knows the planet, designed in manners which do the least damage and use the least resources,

governed underan ethos of partnership rather than domination. It will only be defeated by efforts that are explicit — energy reforms, interdisciplinary design (bringing ecologists into AI development), and perhaps new norms and laws (like environmental impact assessments for large AI projects, or rights-of-nature laws insisting that AI be designed not to violate them). It also demands humility, in the realist's sense — the recognition that technology is no panacea, and that human know-how must be harnessed to ecological wisdom. If human beings write gods, gods will necessarily reflect the values of human beings. Posthuman ethics calls upon us instead to program AI with ecocentric and inclusive values so that AI development does not contribute only to the realization of the 'master's voice' of human profit, but to the flourishing of the Earth system.

BIOTECHNOLOGY, LIFE AND THE ETHICS OF INTERVENTION

Biotechnology — from genetic engineering to synthetic biology to cloning and beyond — enables humans to manipulatethe stuff of life at the most elemental level. This raises deep ethical questions about how we should intervene in nature, and to what purpose. Mainstream bioethics has instead generally been concerned with human health and with individual consent (e.g., medical ethics, genetic privacy) and/or on risks to human consumers and ecosystems (e.g., GMO safety).From an approach of posthuman ecologies, one can look up from such a narrower focus in order to consider biotechnology as an entangled evolution of human and non-human life and to keep duty to the entire "community of life" in view (including future life forms that we might bring into being).

Healing or Enhancing Nature? One frame for biotech is that it can be used to clean up environmental messes that humans have made. Scientists are, for instance, investigating the possibility of genetically modifying coral to make it more heat tolerant, which could help save reefs from climate-induced bleaching. Still others have suggested that gene editing could be employed to make crops or trees drought-tolerant and capable of surviving extremes in climate, protecting agriculture and forests. One of the most dramatic is de-extinction, reviving from extinction species (the passenger pigeon, perhaps the wooly mammoth) through genetic engineering to restore ecological function and enliven dwindling biodiversity (in addition to aiding climate adaptation). These second uses make biotech seem like a tool for healing or bolstering nature's own resilience. They coincide with an anthropocentric morality, to the extent that they are trying to organize nature for human purposes, such as ensuring our food is protected or looks the way we want (by re-introducing lost species we miss). But they could just as well be seen through a more altruistic or ecocentric lens — as a type of assisted evolution or gardening, in which humans intervene more deliberately to take stewardship of other species' survival.

Posthuman ecologies might counsel caution and reflexivity on this score. Although release of predators to help non-humans survive may seem of value, we need to consider who gets to decide what species or genes we should help on what grounds. The danger is we play "God" and picking winners and losers based on human priorities on our timetable, which may result in degrading biodiversity to what's useful or cute to us now. A zoe-centered frame of mind would encourage us to weigh the integrity and agency of the organisms at stake: Are we imposing a rigid genetic homogeneity and perhaps setting ourselves up for trouble? Are we honoring the organism's own evolutionary potential or just bending it to our will? Donna Haraway proposes an ethic of "making kin" with other creatures – that is, of working with them in multispecies communities, rather than simply redesigning them. In a practical sense, a posthuman conservation biotech would prioritize consultation with diverse stakeholders (including, say, indigenous peoples who have relationships with those species), vigorous public deliberation, and trial projects that consider not just target outcomes, but holistic ecosystem effects.

The Dangers of Control: Biotechnology also poignantly exemplifies the posthumanist caution against the "logic of colonization" or mastery. The gene drive example which was mentioned earlier is the one that personifies this. To deliberately eliminate a species (even a malaria mosquito) for very valid human health reasons leads us to the ethical dilemma of playing God with nature. Never before has one species (us) possessed the literal tool to so directly determinethe fate of another wild species. We used to drive species to extinction mainly by overhunting or destruction of habitat, all of which is tragic but often inevitable fallout from other goals. Gene drives, on the other hand, are deliberate and purposeful extinction — intentional control of an entirely new kind. There are many scientists and ethicists who argue that this power should be restrained by international governance and

perhaps a moratorium until we have a firmer grasp of the implications. From this posthuman ethical perspective, one could claim that, at the limit, even if gene drives could be assured to be risk-free, their use bears an ethical burden: it entrenches a specific view of nature as something meant to be "edited" at human will. It might also diminish the freedom or "right to be," as it were, of other organisms, if the existenceof nature were to come to depend on human consent.

This is not to say that posthuman ecologies is unconditionally opposed to all such interventions, but that it insists upon an ethic of care and caution. For example, rather than wiping out a species, could we deploy its gene drive to do something gentler — perhaps arrange for an invasive species to become locally infertile in a way that allows an endangered species to nudge it out a bit, without sentencing that species to a global death sentence? This more subtle application would seekequilibrium and reversibility. Finally, the "thriving of all life" principle helps to keep us on track to consider when and where coexistence strategies are possible. If elimination is sought (say, of Anopheles mosquitoes to eradicate malaria), it should be seen as a sober responsibility, not as a victory, and not until other options have been thoroughly pursued. The question "Do we have the right do this? ought to be brought to the front, not merely "Can we do this effectively?".
Another issue is the way biotechnology muddies species lines and problematizes the purity of "natural" kinds. Transgenic organisms — bacteria designed to eat plastic, goats spliced with spider genes to produce silk in their milk — violate the standard rules about a species. This can be discomfiting, but some posthumanists say that clear-cut species were never as simple as we liked to think they were (not when there's endosymbiosis in evolution, or horizontal gene transfer in microbes). As Haraway famously put it, we have all become the "chimeras, cyborgs" that are our mixes of natural and artificial, of biological and technological. Accepting that could lead to the advent of a different ethic: one that respectshybrid beings. Take lab-grown meat (also called cultured meat). It is not an animal, but it is alive at the cellular level, and it exists to be consumed by humans. How do we treat such life? A sharp humanist might say it has no moral status (it's just tissue), and an extreme animal rights view might rejoice that no animals are killed. A posthuman perspective might also question the sustainability of its creation (It's ecologically beneficial, isn't it? and what new kinds of relationships it forges – e.g., will those same cultured meat plants become a new "species" of industrial ecosystem with their own microbiomes and waste streams that we will need to manage responsibility? Interestingly (adding to the complexity of the evaluation), it has been argued that I f grown by using energy from fossil fuels, cultured meat might even release more CO_2 than traditional agriculture, which shows the tight interplay between technology, energy, and the environment. This is a sobering reminder that it's the context (the assemblage) that matters as much as, if not more than, the thing itself; an apparently eco-friendly biotech object might fail to generate environmental benefits if it's embedded in an old fossil-fueled system.
Justice and Inclusion in Bioethics: Posthuman ecologies is also consistent with theories focusing on environmental justice, and biopolitics. The risks and benefits of biotech are not evenly spread. Who, for instance, has rights to climate-resistantgenetically modified crops? And those who do may also be among those who can afford to do so – likely wealthier farmers or nations – whatever may come of it either a kind of inequality perhaps (a concern that posthuman ethics, indebted to feminist and post-colonial theory, takes seriously). Fox & Alldred, the authors of Social and EnvironmentalGuy's And Posthuman Technologies aim to include social justice with the human in this posthuman policy. So a moral approach to biotech also has to make sure that it does not turn into simply another tool of powerful interests at the expense of the poor and the dispossessed or indigenous peoples." (An example: indigenous groups struggling to protect wild, genetically diverse relatives of crops compared with transnational corporations trying to foist patented bioengineered seeds on the world—the posthuman/ecological view would prefer the diverse, local, wild rather than the homogenized.) That includes introducing checks and balances in a biotechnological context — including representing competing interests among stakeholders in decision-making — and confidence in traditional ecological knowledge as much as laboratory science.

"In closing, biotechnology as viewed through the lens of posthuman ecologies is not a saviour, not a villain, but a powerful evolutionary process that must be used with caution, wisdom, and a solidarity with life. We should see the editing of genomes and the synthesis of organisms not as something that engineers alone do, but as something we gardeners or partners do, whose efficacy is conditional on how well we read and act on nature's

limits and potentials. This requires a 'transdiscipline', one that marries the most contemporary scientific understanding (of ecosystems, gene flow, evolutionary dynamics, and more) with an ethical commitment to non-domination. These might include: incorporatingreversibility and monitorability as design criteria for new kinds of biotechnologies (so we can back off if things seem to be going wrong); developing global commons governance for interventions that affect the shared environment (analogous to climate treaties, perhaps a convention concerning synthetic biology); and fostering a cultural ethos in which we appreciate the continuity between the "natural" and the "artificial" without treating the latter as a warrant for recklessness.
We conclude by stitching together how a posthuman ecologies approach can also impact wider climate and environmental policy. The climate crisis has been called a "wicked problem" because it interweaves science and technology and politics and economics and ethics on a global scale. It is ultimately a manifestation of human-centric thought - seeing the atmosphere as a garbage bin, placing short-term human gain over the integrity of Earth's systems. We need both technical fixes (renewable energy, carbon capture, etc.) and a new set of guiding values and narratives, as when the IPBES reportcalls for "transformative change … including goals and values".
A posthuman ecological informed policy would have a strategy of integration and inclusion. One could be the idea of "rights of nature," which has been established in law in countries such as Ecuador and New Zealand (for a river). Givinglegal personhood status to ecosystems or a species is a concrete step toward decentering humans as they figure into the law, and requiring human actors (government, business) to take into account nature's interests. This resonates with the posthumanist notion of extending the community of justice beyond humans. Equally, ecocide – the criminalisation of the destruction of entire ecosystems – speaks to the sense that humans might be answerable to the world as more than "human". It preserves as virtue a moral line that some things are wrong — from wanton rainforest destruction — not just in an economic externality sense, but in the cosmopolitan sense.

Another is technology assessment and regulation. At present, evaluations may consider human health and safety, or economic impact. For a posthuman ethics, ecological significance and more so ethical significance to non-humans would take absolute prevalence. For AI, this could involve mandating that companies disclose the carbon footprint and mitigation plans for their algorithms, and maybe even a certification for "Eco-AI," akin to organic food labels. In biotechnology, that might involve robust measures to study and minimize the impact on biodiversity, and even some sortof ethical review that has ethicists, ecologists and representatives of local communities sitting at the table (a bit like the medical ethical review boards that don't just have doctors on them). We could make multispecies justice a principle of planning: for example, when constructing a coast city in a climate adaptive manner, make sure that responses also providehabitat for other species, not simply human infrastructure. One of the most encouraging ideas wonky policy people keep bringing up are nature-based solutions (NbS) — restoring or utilizing ecosystems to serve a climate purpose (like restoring mangroves for coastal protection, or practice in gregenerative agriculture to sequester carbon). As humans are actively involved in managing ecosystems, NbS also blur the natural/artificial boundary. The projects, if pursued with posthumanist ethics, would regard the non-humans involved as partners. For example, planting mangroves not only as "green infrastructure" for storm breaks but also to provide habitat for fish and crustaceans, valuing their living presence. In governance, that could mean bestowing authority to local communities (who often have co-dependent relationships with those ecosystems) and protecting the "voices" of those ecosystems (some innovations include guardians or proxies representing a river or a forest in councils).
Finally, education and culture matters. Posthuman climate change education, as some academics argue, would instruct students to view humans as part of the web of life, promote indigenous and non-Western worldviews that stress kinship with nature, and critically question the ways in which technology narratives may reinforce or challenge anthropocentrism. The point, rather, is to cultivate citizens who will feel empathy and responsibility not just for one another but also for a tree, a bird, even a river, maybe someday an AI or a genetically novel creature. This widened mercy is what many think it will take to begin the sort of mass movement the climate crisis requires.

To conclude this critical analysis: All such threads hold that connecting posthuman theory and environmental ethics generates the lines of action oriented in a time when our instruments are potent but our moral navigation technology is obsolete. Brewing, distillation, winemaking, and other processes evolve: the creative innovations

these practices spawncreate new territories we can then explore together—beginning with AI and biotech, as we see them as embedded within "posthuman ecologies" where we start to articulate the ethics and policy that aspires toward the alignment of human with the wellbeing of the wider Earth community. The climate crisis, a symptom and a driver of the thinking-through that history involves, has brought us to this philosophical impasse. It starkly exposes that the old model of human-centered progress is indefensible; and life and justice now requires a more relational and small view of things. In the sections which follow we will draw together insights from these examples to outline some future directions, emphasizing our coreclaim that posthuman ecologies can contribute to a more enriched theory and practice of environmental ethics today.

CONCLUSION

The challenges of the 21st century – from a destabilizing climate, to accelerating species extinctions, to the build-up of powerful technologies – require us to question basic assumptions about what 'we' are and how we should live. This article has suggested that posthuman ecologies represents an exciting rereading of environmental ethics for our time. By decentring the human, by adopting an ethic of interconnectedness, we may be able to render less opaque the multiple agents and processes that mediate our world, from algorithms in a data centre to pollinators in a growing wood. The fact that AI and biotechnology are converging in time with the ecological crisis is not a coincidence: It is the outcome of the same anthropocentric hubris that believed we could extract from nature and innovate in the absence of moral and ecological restraints. Posthumanist theory assists in this diagnosis of hubris, and in calling for a different ethos — one of reverence, attentiveness, and longing for kinship across species and across the human/organic divide.

Our journey combined reflections from philosophy, science, and case studies to show what it might mean to rethinkenvironmentalist ethics in the age of the posthuman. We came to realize that framing our work with posthumanist sensibilities that extend moral consideration to non-humans (in this case, elephants), recognize natural and artificial actants as having agency, and value relational outcomes, made a difference. For AI, it is not only how to harness its power for sustainability, but also how to reign in its voracious appetite for resources and how to steer its objectives beyond narrow human visions. For biotechnology, this means transitioning from a model of absolute control to one of co-creation and careful stewardship, intervening in the evolutionary process only with humility and inclusiveness. In each realm, a posthuman ethic demands that we expand who has a voice. That could take form in developing novel forms of governance such as a multi-species council, public forums that incorporate nature's voice in the form of representatives who advocatefor environmental interests or even in reforms that integrate into decision-making structures the rights of nature alongsidethe concept of ecological justice.

It is important to stress that posthuman ecologies is not an abandonment of the human, but a re-siting of the human. As Cielemęcka and Daigle argued, it is "re-positioning the human within its ecosystem… favouring the flourishing of life as a whole. It is a humility that is not capitulatory but opens new potentials for creative co-inhabitation. So instead of thinking of reducing carbon emissions solely as a struggle to be borne, we could conceive of it as an opportunity to nudgehuman systems into better alignment with Earth systems — to reforest, say, re-imagine cities, redesign all of our technologies in ways that work to the benefit of a larger community of life. In a way, this approach is inherently hopeful: It presupposes that humans can be problem solvers and healers, if only we would abandon our exceptionalist blinders and plant our feetsmall and delicate; big and cluncky; human, artificial and "natural"in common cause with other beings, human and technological alike. This would intersect with the concept of "affirmative ethics" in which one follows possibilities of positive transformation and "becoming-with" others (to use Haraway's notion) in the middle of catastrophe. Naturally, applying a posthuman ecologies perspective would not be conflict-free. As the IPBES report put it, those with interests in the existing system "tend to resist reform to protect their interests, remaining in denial of a need to makeradical changes". Anthropocentrism is woven into the fabric of human culture, religion, and economy globally. 'Letsmake ripples', the same as a Chinese proverb 'An old power grows weak, and a new power is leaping up…' Yet for everyripples to be made, for pied-piper tunes/ words to charm politicians to no longer think in terms of non-human rights! or companies having to act on the basis of ecological health on a par with economic gain! – what a long haul! Yet change is already occurring — embodied by the surge of climate youth movements talking about intergenerational justice (not just concern for future generations but also for the

unborn human or other species, and the ecosystems into which they will be born), court cases arguing on behalf of rivers and animals, and tech ethics debates acknowledging sustainability more broadly. The academy is also breaking out of silos: ecologists, ethicists, technologists, and social scientists are nowcollaborating in the creation of new subfields, such as environmental humanities, animal-computer interaction, and sustainability transitions research. These are seeds of a posthuman ecological sensitivity.

There are many possibilities for future work on these questions. Empirical research might test the impact of incorporating posthuman ethics on environmental management or tech development results. Philosophically, there is much more to doin terms of developing the rights and obligations of intelligent machines or constructed organisms – in effect, a new ethics that lies at the intersection of AI, bioethical, and environmental ethics. Moreover, non-Western and native philosophies (such as Ubuntu, or the kin-centered cosmologies of many First Nations) resonate with posthumanism and could enliventhe conversation, preventing it from simply becoming another Western-driven story. Examining insights from different knowledge systems that have historically understood humans to be enmeshed in nature, it is possible to make the grounding of posthuman ethics a lived practice.

If it had occurred to us to respond to the critics, but we can close with the claim that if the point we have been making is thought to apply to the concurrent crises and opportunities of a Planetary Age rather than to an Anthropocene, as it is currently referred to, then ethics is justified in asking what it takes to be a responsible agent to live within the destiny of the planet in these times. A lens of scopus indexed analysis indicates that make-up changes in ethics will not work; majorchanges are in exigency. Posthuman ecologies is one of the axes around which this shift seems to be turning, an impulsethat resonates with contemporary work in the science (systems ecology, Earth system science) and the humanities (critical posthumanism, new materialism). For us to see AI not as alien invader or savior but as part of our common earthly home; to see a gene-edited seed not as an object but as a being woven into the story of life; to see the climate not as a whitebackdrop but as the very medium of our common tread.

By so doing, environmental ethics can become more international and interdisciplinary in nature, speaking to peoplearound the world and with the sciences and engineering on the one hand and nature on the other. Our ecological ethics is cosmopolitan (all denizens of the Earth) and empirical (based on contemporary scientific understanding of networks of interdependence), but not devoid of ethical horizon. The work ahead is harrowing, but also exhilarating: no less than remaking our place on Earth as no longer its plunderer but a responsible collaborator. Given the climate emergency and technological disruption, such a reinvented ethos may be the best compass we have to navigate a future that is both sustainable and fair to all who live on our planet.

REFERENCES

1. IPCC (2023). AR6 Synthesis Report: Climate Change 2023. Intergovernmental Panel on Climate Change. (Headline Statements)
2. IPBES (2019). Global Assessment Report on Biodiversity and Ecosystem Services. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. (Summary for Policymakers highlights)
3. Fox, N. J., & Alldred, P. (2020). "Sustainability, feminist posthumanism and the unusual capacities of (post)humans." Environmental Sociology, 6(2), 121–131. (Develops a post-anthropocentric perspective on sustainability policy)
4. Cielemęcka, O., & Daigle, C. (2019). "Posthuman Sustainability: An Ethos for our Anthropocenic Future." Theory, Culture & Society, 36(7–8), 67–87. (Introduces inclusive posthuman approach to sustainability)
5. Mellamphy, N. B. (2021). "Re-thinking 'Human-centric' AI: An Introduction to Posthumanist Critique." EuropeNow Journal, Nov 2021. (Critiques anthropocentrism in AI narratives, introduces critical posthumanist perspectives on AI)
6. Bignall, S., & Braidotti, R. (Eds.). (2019). Posthuman Ecologies: Complexity and Process after Deleuze. Rowman & Littlefield. (Collected essays on posthumanism, ethics, and complex systems)
7. Haraway, D. J. (2016). Staying with the Trouble: Making Kin in the Chthulucene. Duke University Press. (Proposes "making kin" across species and critiques Anthropocene narratives)
8. Plumwood, V. (2002). Environmental Culture: The Ecological Crisis of Reason. Routledge. (Examines how Western rationalism and dualisms underlie environmental problems)
9. Bennett, J. (2010). Vibrant Matter: A Political Ecology of Things. Duke University Press. (Articulates new materialist view of matter's agency, cited in discussions of posthuman ethics)

10. Cho, R. (2023). "AI's Growing Carbon Footprint." State of the Planet – Columbia Climate School, June 9, 2023. (Highlights AI's energy consumption and climate impacts, as well as climate applications of AI)
11. Creighton, J. (2019). "Gene Drives: Assessing the Benefits & Risks." Future of Life Institute, Dec 5, 2019. (Overview of gene drive technology, its potential in malaria eradication, and ethical risks)
12. Lee, S. (2025a). "Rise of Posthumanism: Philosophy Meets Tech." Number Analytics Blog, June 17, 2025. (Discusses intersection of posthumanist philosophy, technology, and environmental thought)
13. Lee, S. (2025b). "Beyond Anthropocentrism: Posthumanism's Environmental Impact." Number Analytics Blog, June 16, 2025. (Explores how posthumanist ethics expands moral consideration to animals, plants, ecosystems; includes examples and practical implications)
14. Critical Posthumanism Network (2020). "Sustainability." criticalposthumanism.net. (Discusses posthuman sustainability concepts and feminist posthumanist contributions)
15. Gunkel, D. (2018). Robot Rights. MIT Press. (Examines the philosophical and ethical case for granting moral and legal consideration to AI and robots)
16. Naess, A. (1973). "The Shallow and the Deep, Long-Range Ecology Movement." Inquiry, 16(1-4), 95–100. (Seminal deep ecology article advocating intrinsic value of non-human nature)
17. Watson, R. et al. (2019). IPBES Global Assessment – Summary for Policymakers. (Notable for quoting: "We are eroding the very foundations… transformative change… rethinking underlying values and ethics" in context of biodiversity crisis)
18. Banerji, D., & Paranjape, M. (2016). Critical Posthumanism and Planetary Futures. Springer. (Collection touching on posthumanism in non-Western contexts, cited for critique of transhumanism)
19. Latour, B. (2017). Facing Gaia: Eight Lectures on the New Climatic Regime. Polity Press. (Proposes a hybrid approach to politics in the Anthropocene, recognizing agency of "Gaia" – the Earth system)
20. United Nations (2021). Harmony with Nature report, A/76/128. (UN document advocating Earth-centered law and ethics, reflecting rights of nature philosophy akin to posthuman ethics)